

Introduction

IMAGE PROCESSING AND COMPUTER VISION – PART 2

SAMUELE SALTI

Course structure

Prof. Giuseppe Lisanti (First Part)

- Image formation and acquisition process
- Spatial Filtering
- Edge detection
- Local Invariant Features
- Object Detection

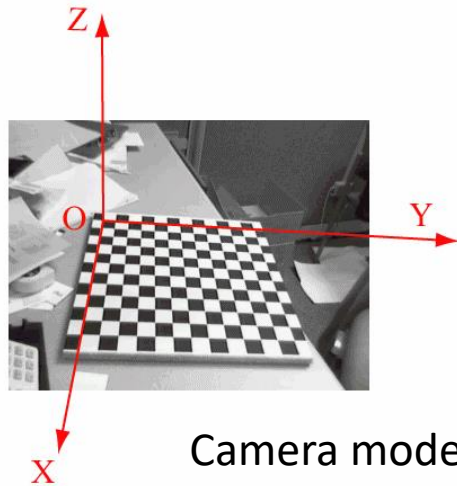
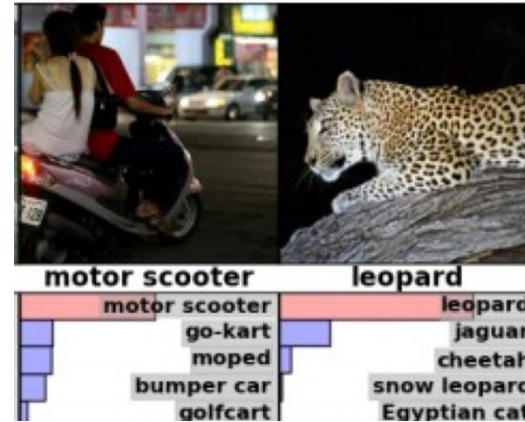
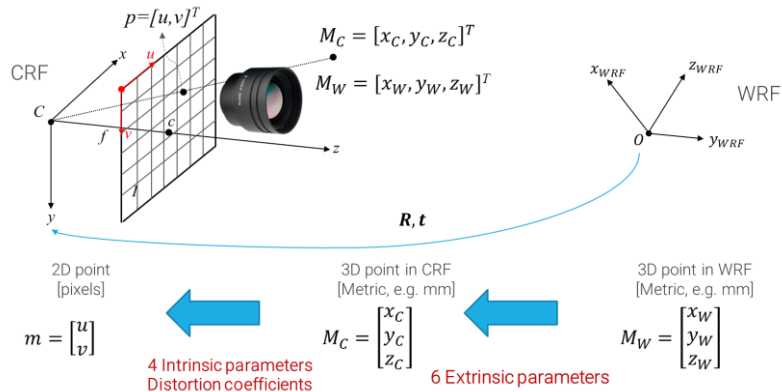
- OpenCV + spatial filtering/edge Laboratory
- Local Invariant Features Laboratory

Prof. Samuele Salti (This Part)

- Camera Calibration
- Image classification
- Convolutional Neural Networks
- Successful architectures
- Training recipes

- Lab session on Camera Calibration
- Lab session on PyTorch and CNNs
- Lab session on Transfer learning

This module - Foundations



Camera model and camera calibration

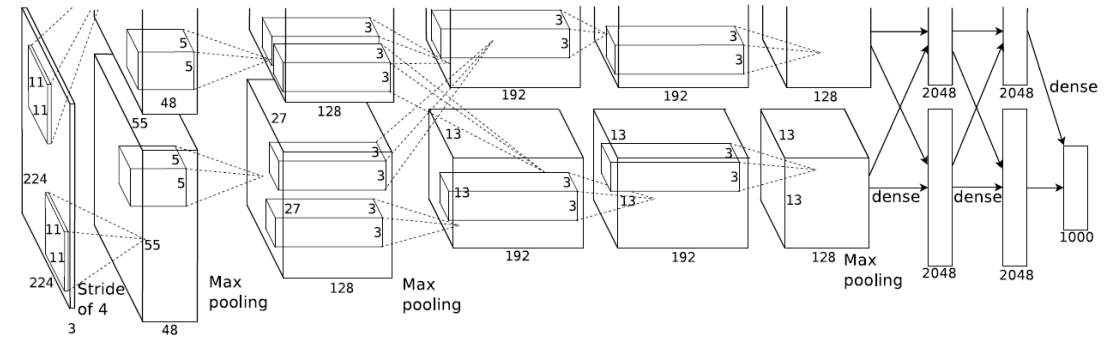
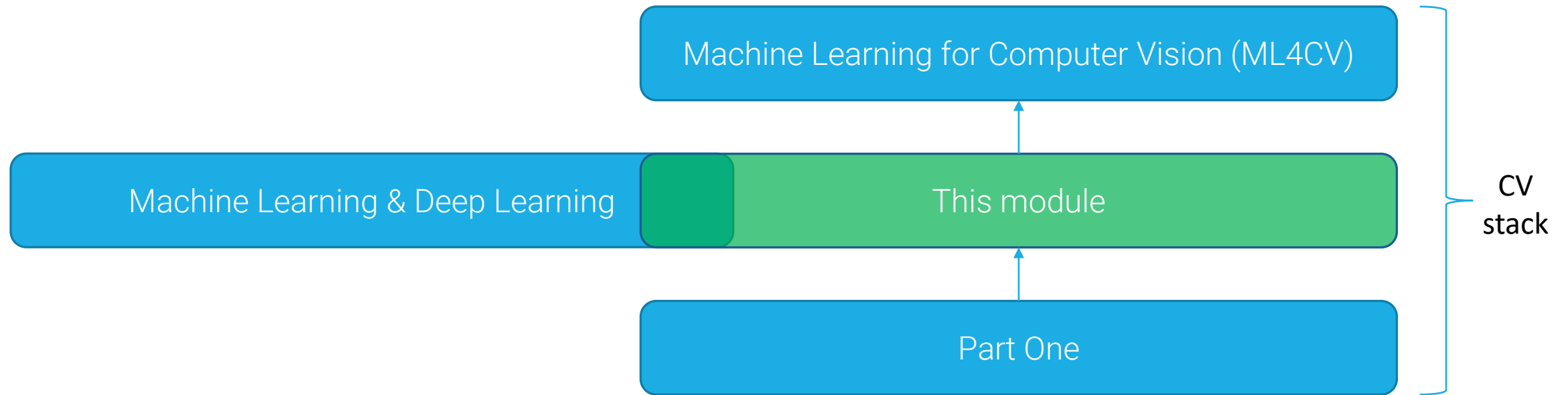
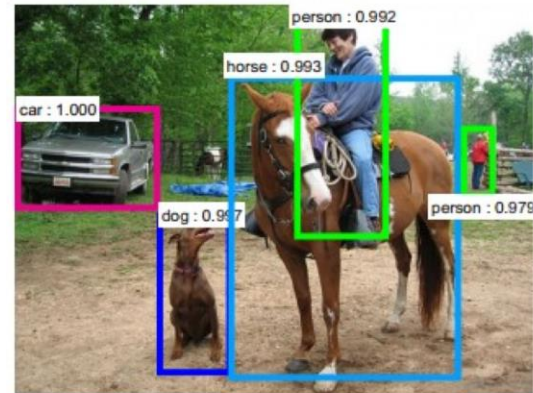
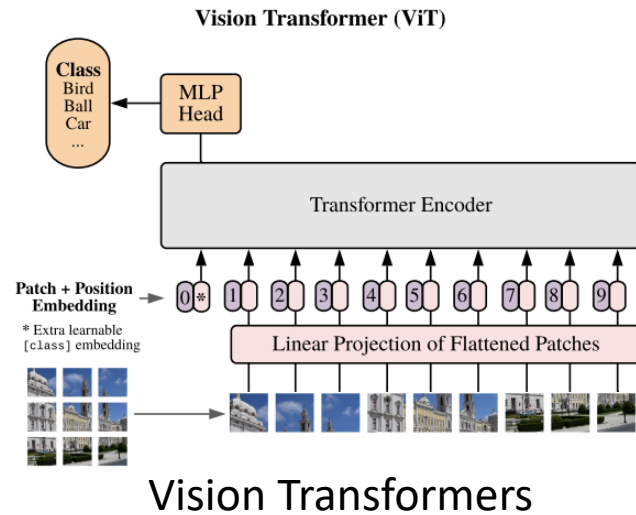


Image classification – shallow ML and CNNs

Relationship with other courses



ML4CV – Established tasks...



Object detection



Semantic and instance segmentation

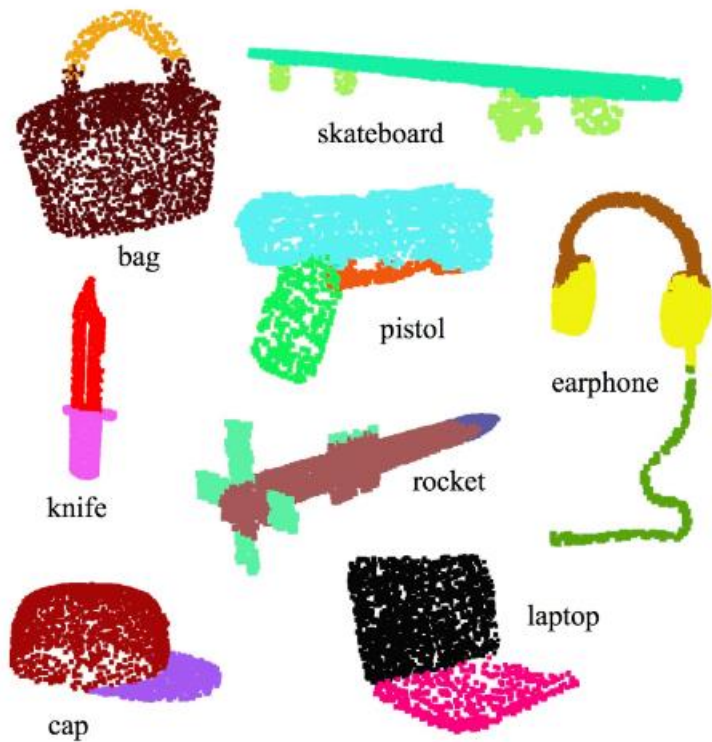


Metric learning



Depth estimation

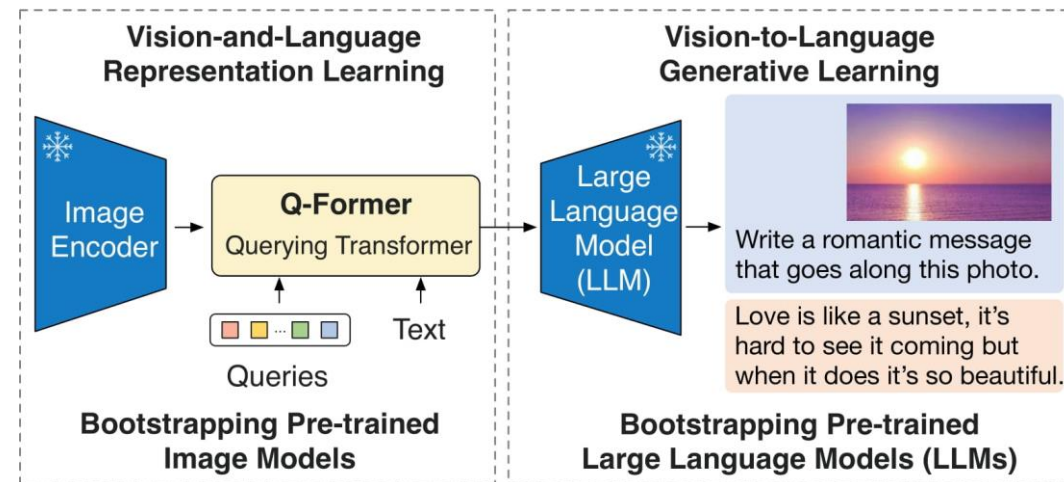
ML4CV - ... and new ones



3D data processing

A photo of a Corgi dog riding a bike in Times Square. It is wearing sunglasses and a beach hat.

Text-guided Image generation with diffusion models



Vision and Language models

Course logistics

Lessons: I'd like to start at 11:15 on Mondays and 10 on Thursdays. And then have a 15 minutes break midway.

We will start at 09:15 on Thursdays when we will have lab sessions.

Textbooks: there is no official textbook. Some suggestions available on-line on the course [web-page](#). In particular,

- image formation model and (partially) camera calibration are covered in chapters 2-4-6-7 of the [Multi View Geometry](#) book by Richard Hartley and Andrew Zisserman
- the image classification part is mostly covered by chapters 4 to 8 of [Dive into Deep Learning](#) book.

Exam: one written exam covering both modules, open questions on the course content + 2 assignments

Dates: 25/06/2024 – 17/07/2024 – 13/09/2024